REMARKS

I. The Invention

The present invention relates to the cloning and characterization of a *Fucus* vanadium peroxidase. The present inventors identified for the first time the full-length polynucleotide sequence as well as the amino acid sequence of the enzyme. Furthermore, the inventors discovered that the N-terminus of this enzyme is not necessary for its activity. As examples, two N-terminally truncated enzymes have been recombinantly produced and shown to possess enzymatic activity.

II. Status of the Claims

Claims 1-30 were originally filed. Claims 1-15 and 17-19 have been canceled. Claims 16 and 20-30 are currently pending.

III. The Amendments to the Specification

The specification is amended to delete all reference to Table 1. Also, the three recombinant vanadium peroxidase polypeptides described in Table 1 are now referred to by their individual construct designations in the text of the specification, support for which is found in Table 1. No new matter is introduced by the present amendments. Neither do the present amendments require new searches by the Examiner. Entry of the amendments is respectfully requested.

IV. Claim Rejection

35 U.S.C. §112, First Paragraph: Enablement

The Examiner maintained the rejection of claims 16 and 20-30 under 35 U.S.C. §112, first paragraph, for alleged inadequate enablement. In the Final Office Action of January 5, 2004, the Examiner indicated that Applicants' argument in the previous response failed to overcome the enablement rejection, citing the following specific reasons: first, the 441-676 fragment of SEQ ID NO:2 has not been shown to have vanadium peroxidase activity; and

second, the three recombinant vanadium peroxidase polypeptides in Table 1 are not within the scope of the pending claims because these recombinant polypeptides correspond to amino acids 1-600, 60-600, and 236-600 of SEQ ID NO:2 and therefore do not contain the 441-676 fragment of SEQ ID NO:2 (the bridging paragraph between pages 2-3 of the Final Office Action mailed January 5, 2004). The Examiner further stated in the Advisory Action of March 15, 2004, that Table 1 is incorrect and that one of skill in the art would not be taught how to make and/or use the claimed invention from reading the specification. Applicants respectfully traverse the rejection.

In response to the Examiner's concern that the 441-676 fragment of SEQ ID NO:2 has not been shown to possess vanadium peroxidase activity, Applicants contend that whether this fragment alone is sufficient to support vanadium peroxidase activity is irrelevant to the enablement of the pending claims. The pending claims are drawn to an isolated polypeptide **comprising** the 441-676 subsequence of SEQ ID NO:2 and, among other things, has a molecule weight of between about 40 to about 60 kDa. Based on the art-recognized molecular weight estimate of about 110 Dalton per amino acid, a polypeptide consisting of the 441-676 fragment of SEQ ID NO:2 would have a theoretical molecular weight of about 26 kDa. As such, a polypeptide **consisting of** the 441-676 fragment of SEQ ID NO:2 is not included in the claim scope.

Applicants do not agree with the Examiner's assertion that Table 1 is incorrect and that the three recombinant polypeptides in Table 1 do not comprise the 441-676 fragment of SEQ ID NO:2, for the reasons stated in Applicants' response filed on March 1, 2004. To expedite prosecution, however, the specification is amended to delete all reference to Table 1.

The three recombinant vanadium peroxidase polypeptides shown in Table 1 include the full-length *Fucus* bromoperoxidase (rVPx1) and two 5' (or N-terminus) truncated forms (rVPx2 and rVPx3). According to the description of rVPx1-3 in the sections other than Table 1, these three recombinant polypeptides were produced to confirm the location of the active site of the enzyme at the 3' end (or C-terminus) (see, *e.g.*, page 18, lines 31-31, of the

specification). rVPx1, rVPx2, and rVPx3 correspond to 100%, 80%, and 54%, respectively, of the full-length sequence (page 19, lines 1-3).

These above descriptions of rVPx1-3, in combination with the disclosure of the polynucleotide and amino acid sequences of *Fucus* bromoperoxidase (SEQ ID NO:1 and SEQ ID NO:2, respectively) and the sequences of the PCR primers used for generating rVPx1-3 (page 19, lines 14-26, of the specification), allow one of skill in the art to determine that rVPx1 has an amino acid sequence corresponding to residues 1-676 in SEQ ID NO:2, rVPx2 has an amino acids sequence corresponding to residues 137-676 in SEQ ID NO:2, and rVPx3 has an amino acids sequence corresponding to residues 313-676 in SEQ ID NO:2. In other words, an artisan would readily determine that all these recombinant vanadium peroxidases contain the 441-676 subsequence of SEQ ID NO:2 from reading the present application. Peroxidase activity was detected in all three recombinant vanadium peroxidases rVPx1-3 (page 24, lines 7-11).

As such, Applicants submit that three recombinant polypeptides: rVPx 1, rVPx2, and rVPx3, have been shown to possess vanadium peroxidase activity. Among the three polypeptides, rVPx1 is the full-length polypeptide having the amino acid sequence of SEQ ID NO:2 with a molecular weight of about 74 kDa, rVPx2 is the 137-676 segment of SEQ ID NO:2 with a molecular weight of about 40 kDa, and rVPx3 is the 313-676 segment of SEQ ID NO:2 with a molecular weight of about 60 kDa. Each of the three comprises the 441-676 segment of SEQ ID NO:2. Only rVPx2 and rVPx3 are within the scope of pending claims.

Since the Examiner's specific concerns regarding Applicants' enablement argument have been addressed, Applicants respectfully request that the enablement rejection be properly withdrawn.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

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